

CLAIMS

1/ A pipe or the like, of the type comprising:

- a concrete cylinder (2) possessing at least one annular end (3) of determined longitudinal axis (9),
 5 defined in particular by a longitudinal outside peripheral face (12) and by a transverse front face (11);

- a female end ring (4) coaxial with said end (3) and secured thereto, the ring consisting in:

- firstly a longitudinal ferrule (5) for
 10 securing to the cylinder (2), the ferrule being defined in particular by a longitudinal inside peripheral face (23) fitting snugly against said outside peripheral face (12) in the immediate vicinity of said front face (11); and

- secondly a longitudinal skirt (6) projecting
 15 longitudinally over said front face (11) to engage coaxially on a male endpiece (7) of another pipe (8) or the like,

characterized in that the ferrule (5) is in a state
 20 of circumferential elastic tension providing sealing relative to said outside peripheral face (12) by said inside peripheral face applying thereagainst transverse pressure which is circumferentially distributed in continuous manner.

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2/ A pipe or the like according to claim 1, characterized in that said circumferential elastic tension is such that said inside peripheral face (23) is fastened, at least in part, to said outside peripheral face (12) by the mutual
 30 friction effect that results from said transverse pressure.

3/ A pipe or the like according to claim 2, characterized in that it includes at least one band (91) coaxially
 35 surrounding the ferrule (5) and placed in circumferential tension.

4/ A pipe or the like according to any one of claims 1 to 3, characterized in that said inside peripheral face (23) presents at least one continuous annular sealing portion in relief (29) facing said outside peripheral face (12) in a state of elastic and/or plastic transverse compression thereagainst, formed integrally with the ferrule (5).

5/ A pipe or the like according to any one of claims 1 to 4, characterized in that said outside peripheral face (12) and said inside peripheral face (23) flare in the longitudinal direction (13) going away from said front face (11) and relative to the transition (22) between the ferrule (5) and the skirt (6).

6/ A pipe or the like according to claims 4 and 5 in combination, characterized in that said continuous annular portion in relief (29) is in the form of a rib (29) and there is only one of them.

7/ A pipe or the like according to any one of claims 1 to 6, characterized in that said inside peripheral face (23) is fastened to said outside peripheral face (12) by annular adhesive between them, in particular continuous adhesive (52).

8/ A pipe or the like according to any one of claims 1 to 7, characterized in that it includes at least one continuous sealing ring of plastic material interposed between said inside peripheral face (23) and said outside peripheral face (12).

9/ A pipe or the like according to any one of claims 1 to 8, characterized in that it includes an annular sealing gasket (18) of an elastically compressible material interposed in elastic transverse compression stress between said inside peripheral face (23) and said outside

peripheral face (12), at least in the immediate vicinity of said front face (11).

- 10/ A pipe or the like according to claim 9,
5 characterized in that said outside peripheral face (12) presents a localized annular setback (17) at least in the immediate vicinity of said front face (11) and in that said gasket (18) is received over a fraction of its transverse dimension in said setback (17).
- 10 11/ A pipe or the like according to claim 9 or claim 10, characterized in that said gasket (18) is in the form of a film (18).
- 15 12/ A pipe or the like according to claim 11, characterized in that said film (18) extends from said front face (11) over a longitudinal dimension shorter than the respective longitudinal dimensions of said outside peripheral face (12) and of inside peripheral
20 face (23).
- 13/ A pipe or the like according to claim 11 or claim 12, characterized in that said inside peripheral face (23) is fastened to said film (18) by annular adhesive between
25 them, in particular continuous annular adhesive (53).
- 14/ A pipe or the like according to any one of claims 11 to 13, characterized in that said film (18) presents at least one continuous annular bulge (77) spaced apart
30 longitudinally from said front face (11) by a distance which is shorter than the respective longitudinal dimensions of said outside peripheral face (12) and said inside peripheral face (23) causing an increase in said tension and in said pressure that is localized
35 longitudinally.

15/ A pipe or the like according to claim 14,
characterized in that said continuous annular bulge (77)
corresponds to a continuous annular groove (79) in said
inside peripheral face (23).

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16/ A pipe or the like according to any one of claims 1
to 15, characterized in that the inside of the ring (4)
presents longitudinal abutment means (34) for engaging
said front face (11), the abutment means being located at
10 the transition (22) between the ferrule (5) and the skirt
(6) projecting transversely relative to said inside
peripheral face (23) and being placed facing said front
face (11).

15 17/ A pipe or the like according to claim 16,
characterized in that the skirt (6) also presents a
longitudinal inside peripheral face (26), and in that the
abutment means (34) also form a transverse projection
relative thereto to serve as a longitudinal abutment for
20 said male endpiece (7).

18/ A pipe or the like according to claim 17,
characterized in that the abutment means (34) comprise a
transverse annulus (34) that is circumferentially
25 continuous, and that presents a longitudinal dimension
that is uniform.

19/ A pipe or the like according to any one of claims 16
to 18 as dependent on any one of claims 11 to 15,
30 characterized in that said film (18) forms an annular rim
extending transversely on said front face (11);

and in that the longitudinal abutment means (34)
press longitudinally against said front face (11) via
said rim.

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20/ A pipe or the like according to any one of claims 1
to 19, characterized in that the inside of the skirt (6)

presents a shape (63) suitable for receiving and holding at least one transverse annular sealing gasket (62) for engaging the male endpiece (7).

5 21/ A pipe or the like according to claim 20, characterized in that the inside of the skirt (6) has at least one transverse annular sealing gasket (62) fixed thereto for engaging the male endpiece (7).

10 22/ A pipe or the like according to any one of claims 1 to 21, characterized in that the ferrule (5) has a transverse annular edge (25) longitudinally opposite from the transition (22) between the ferrule (5) and the skirt (6), and projecting transversely relative to said inside
15 peripheral face (23) in the immediate vicinity of said edge (25), at least one projecting catch (69) engaged in a depression (72) in the outside peripheral face (12) to hold the ferrule (5) longitudinally on the cylinder (2).

20 23/ A pipe or the like according to claim 22, characterized in that said depression (72) is in the form of a transverse annular groove (72) in said outside peripheral face (12).

25 24/ A pipe or the like according to claim 22 or claim 23, characterized in that the ferrule (5) has a plurality of catches (69) that are circumferentially localized, being regularly distributed circumferentially, all occupying the same longitudinal position and engaged in respective
30 depressions (72) or in said annular groove (72).

25/ A pipe or the like according to any one of claims 1 to 24, characterized in that the ferrule (5) is fastened to the cylinder (2) by transverse pins (76) that are
35 regularly distributed circumferentially.

26/ A female end ring for making a pipe or the like according to any one of claims 1 to 25, presenting a longitudinal axis (9) and constituting:

5 - firstly a longitudinal ferrule (5) defined in particular by a longitudinal inside peripheral face (23); and

 - secondly a longitudinal skirt (6) situated axially in line with the ferrule (5),

10 the ring being characterized in that the ferrule (5) is elastically expandable circumferentially.

27/ A female end ring according to claim 26, characterized in that said inside peripheral face (23) presents at least one continuous annular portion in
15 relief (29) that is elastically and/or plastically compressible transversely and that is integral with the ferrule (5).

28/ A female end ring according to claim 26 or claim 27,
20 characterized in that said inside peripheral face (23) flares in the longitudinal direction (13) going away from the transition (22) between the ferrule (5) and the skirt (6).

25 29/ A female end ring according to claims 27 and 28 in combination, characterized in that said continuous annular portion in relief (29) is in the form of a rib (29), and there is only one of them.

30 30/ A female end ring according to any one of claims 26 to 29, characterized in that it presents abutment means (34) on the inside at the transition (22) between the ferrule (5) and the skirt (6), the abutment means projecting transversely relative to said inside
35 peripheral face (23).

31/ A female end ring according to claim 30,
characterized in that the skirt (6) also presents a
longitudinal inside peripheral face (26) and in that the
abutment means (34) also project transversely relative
5 thereto.

32/ A female end ring according to claim 31,
characterized in that the abutment means (34) comprise a
circumferentially continuous transverse annulus (34) of
10 uniform longitudinal dimension.

33/ A female end ring according to any one of claims 26
to 32, characterized in that the inside of the skirt (6)
is shaped (63) suitably to receive and to hold at least
15 one transverse annular sealing gasket (62).

34/ A female end ring according to claim 33,
characterized in that the inside of the skirt (6) is
integral with at least one transverse annular sealing
20 gasket (62).

35/ A female end ring according to any one of claims 26
to 34, characterized in that the ferrule (5) presents a
transverse annular edge (25) longitudinally opposite from
25 the transition (22) between the ferrule (5) and the skirt
(6), and projecting transversely relative to said inside
peripheral face (23) in the immediate vicinity of said
edge (25) at least one catch (69).

30 36/ A female end ring according to claim 35,
characterized in that the ferrule (5) has a plurality of
catches (69) which are circumferentially localized, which
are regularly distributed circumferentially, and all of
which occupy the same longitudinal position.

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37/ A female end ring according to any one of claims 26
to 36, characterized in that the ferrule (5) and the

skirt (6) present respective shapes and transverse dimensions suitable for enabling a plurality of rings (4) to be nested releasably and coaxially by nesting the ferrule (5) of one with the skirt (6) of another.

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38/ A method of manufacturing a pipe or the like according to any one of claims 1 to 25, the pipe or the like being of the type comprising:

- a concrete cylinder (2) possessing at least one annular end (3) of determined longitudinal axis (9), defined in particular by a longitudinal outside peripheral face (12) and by a transverse front face 11;
- a female end ring (4) coaxial with said end (3) and secured thereto, the ring consisting in:
 - firstly a longitudinal ferrule (5) for securing to the cylinder (2), the ferrule being defined in particular by a longitudinal inside peripheral face (23) fitting snugly against said outside peripheral face (12) in the immediate vicinity of said front face (11);
 - and
 - secondly a longitudinal skirt (6) projecting longitudinally over said front face (11) to engage coaxially on a male endpiece (7) of another pipe (8) or the like,

25 said method comprising an initial step consisting in prefabricating the ring (4) and being characterized in that it further comprises the following succession of steps:

- a) prefabricating the cylinder (2) independently of the ring, the ring (4) being in accordance with any one of claims 26 to 37 and being dimensioned in such a manner that, at a determined longitudinal distance from the transition (22) between the ferrule (5) and the skirt (6), and in the absence of the ring (4) being expanded circumferentially, said inside peripheral face (23) presents transverse dimensions that are smaller than those presented by said outside peripheral face (12) at

the same longitudinal distance from said front face (11), but sufficiently close thereto to be capable of being increased to said dimensions by putting the ferrule (5) under circumferential elastic tension; and

- 5 b) engaging the ferrule (5) coaxially on the annular end (3) of the cylinder (2) to a determined relative position in which said transition (22) coincides longitudinally with said front face (11), and fastening the ferrule (5) to the cylinder (2) in said determined
- 10 relative position by placing said ferrule (5) in a state of circumferential elastic tension providing sealing relative to said outside peripheral face (12) by said inside peripheral face (23) applying thereto transverse pressure that is distributed circumferentially in
- 15 continuous manner.

- 39/ A method according to claim 38, characterized in that said circumferential elastic tension is such that said inside peripheral face (23) is fastened at least in part
- 20 to said outside peripheral face (12) by the mutual friction effect that results from said transverse pressure.

- 40/ A method according to claim 39, characterized in that
- 25 said effect is reinforced by banding the ferrule (5) in said determined relative position.

- 41/ A method according to any one of claims 38 to 40, characterized in that coaxial engagement of the ferrule
- 30 (5) on the annular end (3) of the cylinder (2) during step b) is facilitated by placing the ferrule (5) in a state of circumferential expansion greater than that which corresponds to said state of circumferential elastic tension, until said relative position has been
- 35 reached, and

in that the ferrule (5) is allowed to leave said state of circumferential expansion so as to allow said

transverse pressure to be established once said relative position has been reached.

42/ A method according to claim 41, characterized in that
5 the ferrule (5) is placed in said state of circumferential expansion by means selected from the group comprising mechanical means (80) and thermal means.

43/ A method according to any one of claims 38 to 42,
10 characterized in that, respectively during the initial step and during step a), the ring (4) and the cylinder (2) are prefabricated in such a manner that said outside peripheral face (12) and/or said inside peripheral face (23) flare relative to their respective longitudinal axes
15 (9) in a longitudinal direction (13) going away respectively from said front face (11) and from the transition (22) between the ferrule (5) and the skirt (6).

44/ A method according to claim 43, characterized in that
20 during step a) the cylinder (2) is prefabricated in such a manner that said outside peripheral face (12) flares more than does said inside peripheral face (23) relative to their respective longitudinal axes (9).

45/ A method according to any one of claims 38 to 44,
25 characterized in that between steps a) and b), a ring of adhesive (52), in particular a continuous ring, is deposited on a localized zone of said outside peripheral face (12) and/or of said inside peripheral face (23)
30 selected in such a manner that when implementing step b) and thereafter said zone constitutes a zone of mutual contact via said adhesive (52) and of application of said transverse pressure.

46/ A method according to any one of claims 38 to 45,
35 characterized in that between steps a) and b), at least

one continuous ring of plastic sealing material is placed on said outside peripheral face (12) and/or said inside peripheral face (23), and in that during step b), said plastic sealing material between said inside peripheral
5 face (23) and said outside peripheral face (12) is caused to be flattened and/or to creep.

47/ A method according to any one of claims 38 to 46, characterized in that between steps a) and b), a sealing
10 gasket (18) of elastically compressible material is put into place on said outside peripheral face (12) at least in the immediate vicinity of said front face (11),
and in that during step b), said gasket (18) is put into elastic transverse compression stress between said
15 inside peripheral face (23) and said outside peripheral face (12).

48/ A method according to claim 47, characterized in that, during step a), the cylinder (2) is prefabricated
20 in such a manner that said outside peripheral face (23) presents a localized annular setback (17) at least in the immediate vicinity of said front face (11), and in that between steps a) and b), said gasket (18) is put into place by being received over a fraction of its transverse
25 dimension in said setback (16).

49/ A method according to claim 47 or claim 48, characterized in that said gasket (18) is selected in
such a manner that it is in the form of a film (18).
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50/ A method according to claim 49, characterized in that said film (18) is selected and placed in such a manner that it extends from said front face (11) over a longitudinal dimension that is less than the longitudinal
35 dimensions respectively of said outside peripheral face (12) and of said inside peripheral face (23).

51/ A method according to claim 49 or claim 50,
characterized in that between steps a) and b), after said
film (18) has been put into place, a ring of adhesive
(53), in particular a continuous ring, is deposited on a
5 localized zone of said film (18) and/or of said inside
peripheral face (23) selected in such a manner that
during implementation of step b) and subsequently, said
zone constitutes a zone of mutual contact via said
adhesive (53) and of application of said transverse
10 pressure.

52/ A method according to any one of claims 45 and 51,
characterized in that said adhesive (53) is selected in
such a manner that while in the fresh state it
15 constitutes a lubricant associating implementation of
step b) by progressive forced engagement of the ferrule
(5) coaxially onto the annular end (3) of the cylinder
(2), and subsequently serves to fasten them together.

53/ A method according to any one of claims 49 to 51, or
according to claim 52 as dependent on claim 51,
characterized in that said film (18) is selected and
placed in such a manner as to present at least one
continuous annular bulge (77) longitudinally spaced apart
25 from said front face (11) by a distance which is shorter
than the respective longitudinal dimensions of said
outside peripheral face (12) and said inside peripheral
face (23), so as to give rise to a longitudinally
localized increase in said tension and in said pressure.

54/ A method according to claim 53, as dependent on any
one of claims 39 to 41, characterized in that the
hardness and the dimensions of said continuous annular
bulge (77) are selected and step b) is implemented in
35 such a manner that in said determined relative position
said continuous annular bulge (77) causes a corresponding
continuous annular groove (79) to be formed in the inside

peripheral face (23), in particular by localized plastic deformation of the ferrule (5).

55/ A method according to any one of claims 38 to 54,
 5 characterized in that for a ring (4) in accordance with
 any one of claims 30 to 32, during step b) coaxial
 engagement of the ferrule (5) on the annular end (3) of
 the cylinder (2) is stopped when the longitudinal
 abutment means (34) come into abutment against said front
 10 face (11).

56/ A method according to claim 55, as it depends on any
 one of claims 49 to 53, characterized in that between
 steps a) and b), an annular transverse rim of said film
 15 (18) is formed on said front face (11), and
 in that during step b), said coaxial engagement is
 stopped when the longitudinal abutment means (34) come
 into abutment against said front face (11) via said rim.

57/ A method according to any one of claims 38 to 56,
 20 characterized in that for a ring (4) in accordance with
 claim 33, in step a) or after step b), at least one
 transverse annular sealing gasket (62) for engaging the
 male endpiece is secured to the inside of the skirt (6).

58/ A method according to any one of claims 38 to 57,
 characterized in that for a ring (4) in accordance with
 claim 35 or claim 36, during step a), the cylinder (2) is
 25 prefabricated in such a manner as to present in said
 outside peripheral face (12) at a longitudinal distance
 from said front face (11) corresponding to the
 longitudinal distance between said catch (69) and the
 transition (22) between the ferrule (5) and the skirt
 (6), at least one depression (72) for receiving said
 30 catch (69), there being at least one such catch, and in
 that step b) is implemented by progressively engaging the
 ferrule (5) by force coaxially on the annular end (3) of

the cylinder (2) and by pressing said at least one catch (69) on said outside peripheral face (12) by increasing elastic deformation of the ring (4) and by allowing it to engage in said at least one depression (72) by resilient return once said determined relative position has been reached.

59/ A method according to claim 58, characterized in that during step a) said depression (72) is implemented in the form of a transverse annular groove (72) in said outside peripheral face (12).

60/ A method according to any one of claims 38 to 59, characterized in that after step b) the ferrule (5) is fastened to the cylinder (2) by transverse pins (76) that are regularly distributed circumferentially.